**Open Book Assignment 1**

*Please read the complete assignment (right up to the final full stop). Make sure that you understand what you have read. Then start thinking how you would solve the problem.*

Imagine that you want to build a fuzzy controller for a **drip irrigation system**. In the following there is a brief description of such a system.

A brief description: A drip irrigation system consists of a web of water pipes and a pumping station. The pumping station can pump the water into the pipes. These pipes are laid out in a farm field where some crop is growing. There are small holes in the pipes through which the water can drip out and this water irrigates the crop that is growing.

The basic problem: We obviously want to control the amount of water flowing into the pipes. If there is too little water then the crop will dry and wither away. If there is too much of water then the crop will (probably) rot and the excess water will be wasted. Each farmer has to take the decision regarding the optimal amount of water. Based on this decision the farmer switches on or off the pump. We want to automate this decision i.e. we want to automate the switching on / off of the pump.

Some issues that must be considered: In order to build this fuzzy controller assume that you have talked with some agriculture scientists (i.e. the experts). They have told you that the amount of water to be used depends on some factors.

The most important factor is whether the soil is very dry, dry, moist, wet or flooded. Assume that sensors are available that can measure the moisture in the soil.

The second factor is the type of crop. Some crops require more water (like paddy) and others require moderate amount (like lentil) and some require less water. This is known for different crops and can be fed as a table or list to your system.

The third factor is the prediction of weather, particularly forecasts for likelihood of rain. One can think of common sense situations like, if it is very likely to rain, then the pump should not be started. Assume that weather predictions can be fed into the system that you are designing.

Your assignment: Figure out the inputs for your system. Identify the fuzzy sets that you require. Make some assumptions regarding their membership functions. Determine the output (crisp) that is expected from your system. Build the fuzzy rules corresponding to the fuzzy sets that you feel are required for your system.

*Note 1: You are free to consult any material. You are also free to consult each other. However,* ***you have to write your own answer.*** ***Do not copy from each other.***

*Note 2: In case you are making any assumption, then do state it explicitly. You may have to make some assumptions about weather forecast.*

Submission deadline: 14th June, 5 p.m.

Submission style: Build a one / two page report that answers each point mentioned in the item labelled “Your Assignment”. Make sure that any assumption you make is stated clearly.